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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Golf Ball and Method of Making the Same

We, A. G. SPALDING & BROS. LIMITED, a British Company, of Putney Wharf, Deodar Road, London, S.W.15, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention relates to an improved golf ball and a method of making the same.

It is an object of the invention to provide a golf ball which is so constructed that it transmits the blow of the golf club against the ball to the centre and provides a maximum centre reaction therein so as to produce a good distance and feel and accurate control of the ball as it leaves the club head.

Another object of the invention is to provide a method of making a golf ball in which the cover can be injection moulded on the wound core of the golf ball without the heat of the cover material damaging the core, thus eliminating the necessity for freezing the core prior to moulding as heretofore practised.

A golf ball is made in accordance with the present invention by applying to an elastic thread wound centre having the usual interstices in the outer surface thereof a neoprene coating deposited from an aqueous dispersion or solution of neoprene latex. The coating penetrates the interstices in the surface of the wound centre and mechanically interlocks therewith but does not penetrate deeply into the wound centre and bond the outer layers of winding together as was the case when adhesive solutions were used. The latex deposit, since it interlocks with only the outer surface layers of thread, will permit a greater part of the wound centre to react to a blow from a golf club to produce a longer drive. Over

the first coating there is applied a second coating of neoprene and a solvent therefor to form an adhesive coating which is thoroughly dried. The ball is then inserted in a cavity in an injection moulding machine and hot cover stock, preferably having a temperature of between 385°—415° F., is injection moulded around the ball to form a one-piece cover. During the moulding cycle the two coatings form a barrier around the centre to prevent the heat of the cover material from deteriorating the elastic windings, and the second or adhesive coating bonds the cover to the first coating. The ball is cooled in the mould and is ejected therefrom and subjected to the usual finishing operations.

Preferably the cover stock comprises a blend of a low modulus polyester polyurethane elastomer with a higher modulus resin combined with a moulding aid, pigments and an internal lubricant which produces a cover which consistently responds to the blow of a golf club and accurately transmits the force thereof to the centre.

The ball has the requisite physical properties such as click, resistance to cutting and has a high resistance to change in performance due to temperature changes and a high tensile strength. Further, the ball has a good feel when struck and there is good control of the ball when it leaves the club head.

In order that the invention may be more clearly understood, reference is made to the accompanying drawings which illustrate by way of example an embodiment thereof, and in which:—

Figure 1 is a view of a wound centre.

Figure 2 is a view of the centre, shown in Fig. 1, partly in section, with the first coating thereon,

Fig. 3 is a view similar to Fig. 2 with the second coating thereon, and

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Fig. 4 is a view, similar to Fig. 2, of the ball with the cover in place thereon.

As shown in the drawings, a centre 10 is wound of elastic thread 11 to the required diameter and has in its outer surface a plurality of interstices formed by the turns of the thread. In accordance with the present invention the wound centre is provided with a deposit or coating 12 of neoprene latex thereon deposited from an aqueous dispersion or solution of the latex.

While the latex coating may be applied in various ways, it is at present preferred to dip the centres in a tank containing the aqueous dispersion or solution of the latex. The centres are removed from the tank and the first coating is thoroughly dried. To accomplish the thorough drying the coated centres should be allowed to dry in air at room temperature for sixteen hours or for an equivalent time at a different temperature.

As shown in Fig. 2, the latex deposit does not penetrate deep into the windings as occurred with cements previously used, but extends over the surface and into the interstices sufficiently only to provide a mechanical interlock with the wound centre and to fill the voids in the outer surface without bonding the turns together in such a manner as to form a thick and less resilient layer in the outer surface. The latex deposit therefore enables a greater part of the windings of the centre to be free to react to a blow of a golf club resulting in an improved efficiency of the centre to produce a longer flight for the ball.

The dry coated centres are then dipped into an adhesive solution comprising neoprene and a usual solvent therefore to form over the deposit 12 an adhesive deposit or second coating 13. The second coating is allowed to thoroughly dry, at room temperature for sixteen hours or for an equivalent time at a different temperature.

The dried adhesively coated centres are then inserted and centered in the mould cavities of an injection moulding machine which cavities have been wiped with dioctyl phthalate. The moulds are closed and a hot cover stock having a moulding temperature of between 385°—415° F. is injected into each mould cavity to form a one-piece cover 14 around the ball with the second coating serving to secure the cover to the first coating. Preferably a moulding cycle of between 30 to 60 sec. is employed. It has been found that, during the moulding cycle, the two neoprene coatings tend to insulate the ball against the heat of the hot cover stock so that the elastic threads are not damaged or deteriorated due to the heat of the cover stock thus eliminating the necessity of dry icing the centres, as heretofore practiced, to protect the centres from the heat during the forming of the covers.

As soon as the moulding of the covers has

been completed, the moulds and balls therein are cooled and the balls are ejected from the mould cavities. The balls are allowed to age for sixteen hours, after which they are trimmed, tumbled, and washed in water and are then provided with the usual finishing materials.

The preferred cover material for injection moulding the covers comprises a blend of low modulus polyester polyurethane with a higher modulus polyesters polyurethane or a nylon, suitable moulding aids, pigments, plasticisers and internal lubricants and fillers to produce a golf ball cover composition which is highly successful, particularly when injection moulding covers on golf ball centres. Examples of such polyester polyurethanes are Estane 5740×2 with Estane 5740×7 (described in Service Bulletin G-18, Revised July 1960 by B. F. Goodrich Chemical Co. and U.S. Patent No. 2,871,218) and "Texin" (Registered Trade Mark) 192A with "Texin" 355D (described in Processing of Urethane Elastomers Using Thermoplastic-Type Techniques by K. A. Pigott, W. Archer, C. L. Gable and Samuel Steingiser, published by Mobay Chemical Co.). The nylon can be "Zytel" (Registered Trade Mark) 63 sold by E. I. duPont de Nemours & Co. The moulding and/or processing aids may be an acrylonitrile butadiene styrene resin such as polymeric materials resulting from the interaction under polymerising conditions of a conjugated diolefine polymer latex or a conjugated diolefine-vinyl aromatic copolymer latex with a mixture of a vinyl cyanide and a vinyl aromatic, the polymeric materials being marketed under the Trademark "Cycolac" by the Marbon Chemical Division of Bork-Warner Corporation, or polyvinyl chloride or polyvinyl chloride-acetate such as sold under the Trademark "Geon" by B. F. Goodrich chemical Co., with suitable plasticisers and heat stabilisers. Barium stearate can be the internal lubricant and/or filler. Titanium dioxide can be the pigment where white cover stock is desired. Where polyvinyl chloride or polyvinyl chloride-acetate are used, suitable plasticisers as dioctyl phthalates and dioctyl adipate may be used as well as lead phosphate as a heat stabiliser.

The resulting cover for the ball is tough, durable, has good rebound, driving distance, cutting resistance, click and has a particular advantage in that it does not change in performance due to wide temperature changes as may be encountered in playing a ball in winter and summer. Also, the cover stock responds to the blow of a golf club and accurately transmits the force thereof to the centre causing a good feel or control of the ball as it leaves the striking face of the head of a golf club during the playing of the ball.

Examples of the various cover stocks which can be used are as follows:

EXAMPLE I

	Parts by Weight
5 Estane 5740×7	65
Estane 5740×2	35
Cyclac H2502	30
Titanium Dioxide	8
Barium Stearate	2

10 While the above represents the preferred proportions, we have successfully used Estane 5740×2 in amounts between 50—70 parts, Estane 5740×7 in amounts between 50—30 parts and the Cyclac in amounts between 0—30 parts.

15 The ingredients are thoroughly blended in a mill, are sheeted and cut into strips and thereafter ground into particles which are placed in an injection moulding machine and moulded into unitary one-piece covers around the centres of golf balls at temperatures between 385—415° F depending upon the time cycle. The balls are cooled in the mould, removed and finished.

EXAMPLE II

	Parts by Weight
25 Texin 355D	60
Texin 192A	40
Cyclac H2502	30
30 Titanium Dioxide	8
Barium Stearate	1

35 While the above represents the preferred proportions, we have successfully used Texin 355D in amounts between 50—70 parts, Texin 192A in amounts between 50—30 parts and the cyclac in amounts between 0—30 parts.

40 The ingredients are then blended in a mill and the covers moulded in the manner noted above.

EXAMPLE III

	Parts by Weight
45 Texin 355D	60
Texin 192A	40
Cyclac H2502	30
Estane 5740×2	10
Titanium Dioxide	8
Barium Stearate	1

50 While the above represents the preferred proportions, we have successfully used Texin 355D in amounts between 50—70 parts, Texin 192A in amounts between 50—30 parts, the Cyclac in amounts between 0—30 parts and the Estane in amounts between 0—20 parts.

The ingredients are then blended in a mill and the covers moulded in the manner noted above.

EXAMPLE IV

	Parts by Weight	
Zytel 63 (nylon)	100	
Estane 5740×2	100	
Titanium Dioxide	15	65
Barium Stearate	1.5	

While the above represents the preferred proportions, we have successfully used the nylon in amounts between 80—120 parts and the Estane in amounts between 120—80 parts.

The ingredients are then blended in a mill and the covers moulded in the manner noted above.

EXAMPLE V

	Parts by Weight	
Estane 5740×7	750	
Estane 5740×2	250	
Geon 101EP	200	80
Diocetyl Phthalate	35	
Lead Phosphate	10	
Diocetyl Adipate	35	
Titanium Dioxide	90	
Barium Stearate	12	85

While the above represents the preferred proportions, we have successfully used Estane 5740×7 in amounts between 650—850 parts, Estane 5740×2 in amount between 350—150 parts, the Geon in amounts between 0—300 parts, the dioctyl phthalate in amounts between 0—50 parts, the lead phosphate in amounts between 0—15 parts and the dioctyl adipate in amounts between 0.50 parts.

The ingredients are then blended in a mill and the covers moulded in the manner noted above.

WHAT WE CLAIM IS:—

1). A golf ball comprising an elastic thread wound centre having interstices in the outer surface thereof, a first coating of neoprene deposited from an aqueous dispersion or solution of neoprene latex applied to said outer surface, the first coating enclosing the wound centre and mechanically interlocking with the outer surface regions thereof, a second coating comprising neoprene and a solvent, the second coating enclosing and adhering to the first coating, and a one piece cover, said cover being injection moulded around the second coating to which it adheres.

2). A golf ball as claimed in Claim 1, in which the one piece cover is formed from a cover stock which is mouldable at a temperature between 385° and 415° F.

3). A golf ball as claimed in either Claim 1 or Claim 2 in which the one piece cover is formed from a cover stock comprising a low modulus polyester polyurethane elastomer, a higher radius modulus resin, a mould-

ing aid, a pigment and an internal lubricant.

- 4). A golf ball as claimed in any one of the preceding Claims, in which the one piece cover is formed from a cover stock comprising a blend of a low-modulus polyester polyurethane elastomer and a higher modulus polyester polyurethane in combination with an acrylonitrile - butadiene - styrene resin titanium dioxide and barium stearate.

- 5) In the manufacture of a golf ball the steps of depositing on an elastic thread wound golf ball centre, having interstices in the outer surface thereof, a first coating of neoprene latex deposited from an aqueous solution or dispersion thereof, drying the first coating, applying a further coating of neoprene and a solvent therefor on to the coated centre to form a second coating, drying the second coating, inserting the coated centre into a mould cavity, and injection moulding a cover of thermoplastic material around the coated centre to form a ball.

- 6). In the manufacture of a golf ball the steps as claimed in Claim 5, in which the first coating is deposited on the wound golf ball centre by dipping the centre into a tank of the said aqueous solution or dispersion, and the second coating is applied by dipping the

coated centre into a tank of a solution containing the neoprene and solvent therefor.

- 7). In the manufacture of a golf ball the steps as claimed in either Claim 5 or Claim 6 in which the cover of thermoplastic material is injection moulded at a temperature between 385° and 415° F.

- 8). In the manufacture of a golf ball the steps as claimed in any one of Claims 5 to 7 in which the thermoplastic material used for the step of injection moulding is a cover stock as set out in any one of the Examples herein described.

- 9). In the manufacture of a golf ball the steps substantially as herein described with reference to the accompanying drawings.

- 10). A golf ball as claimed in Claim 1, in which the one piece cover is formed from a cover stock as set out in any one of the Examples herein described.

- 11). A golf-ball substantially as herein described with reference to the accompanying drawings.

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COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of
the Original on a reduced scale

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FIG.1

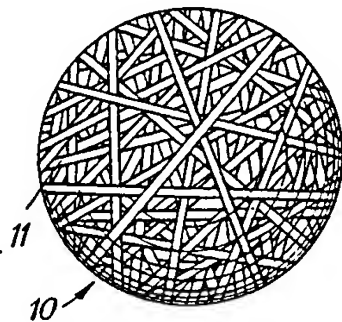


FIG.2

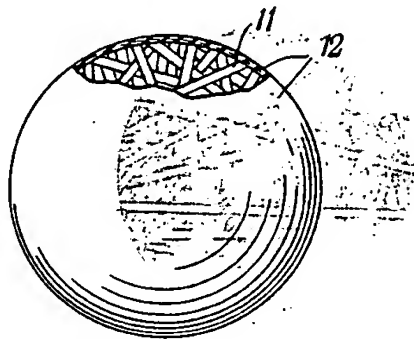


FIG.3

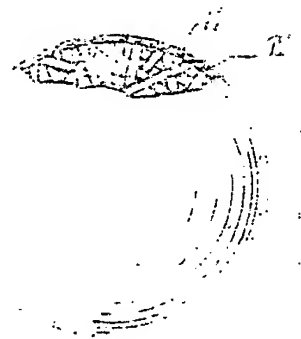


FIG.3

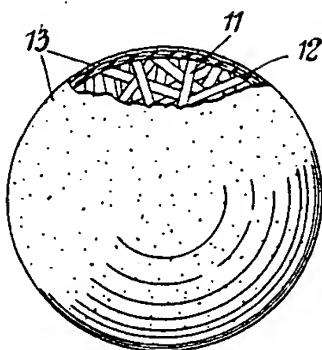


FIG.4

